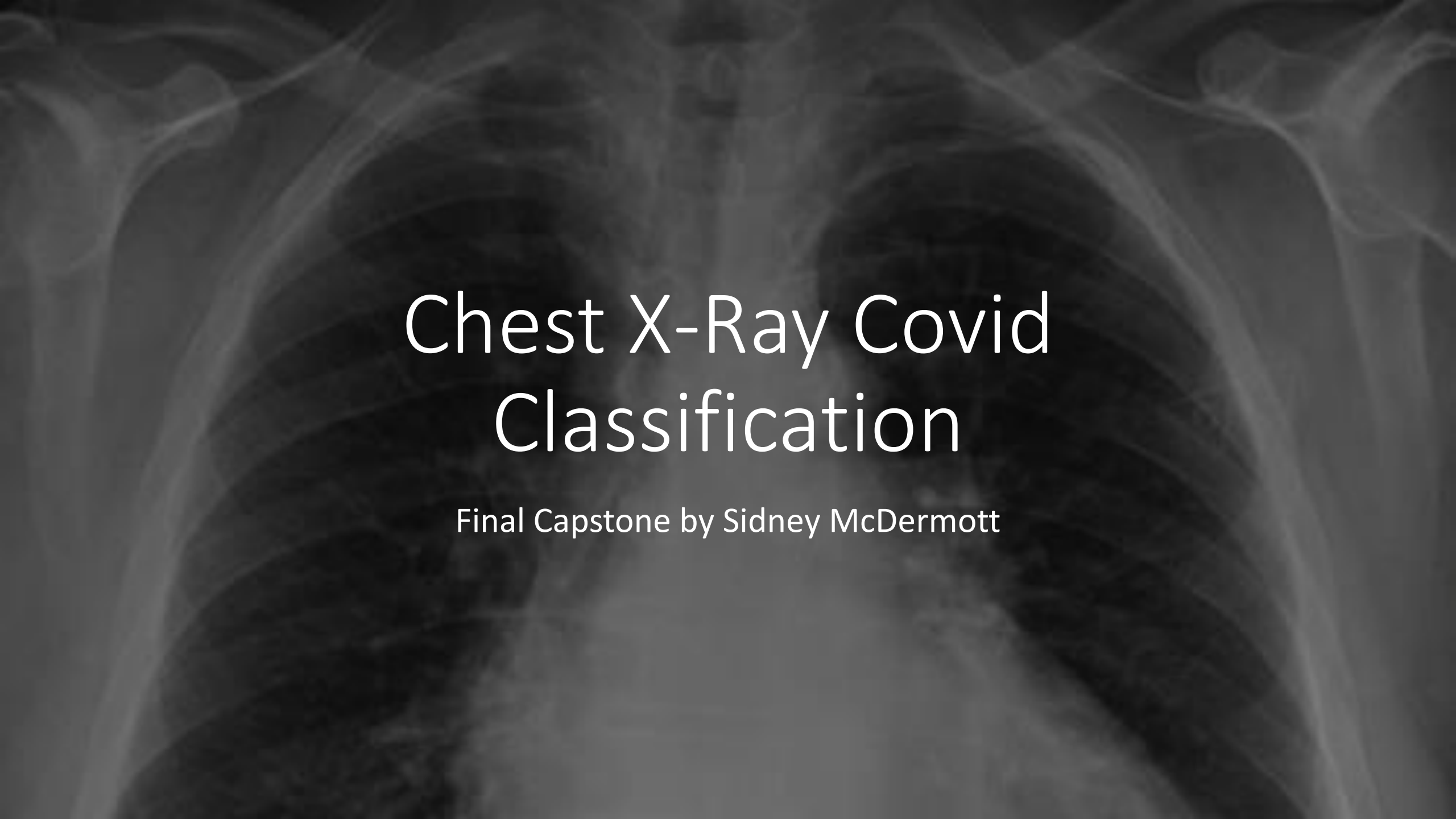


Chest X-Ray Covid Classification

Final Capstone by Sidney McDermott

Business Problem

- 3.6 billion diagnostic x-rays are performed annually worldwide
- Chest x-ray is the first imaging test used to help diagnose:
  - Breathing difficulties
  - Bad or persistent cough
  - Chest pain or injury
  - Fever
- Radiologists often disagree about diagnoses with varying accuracy depending on the condition

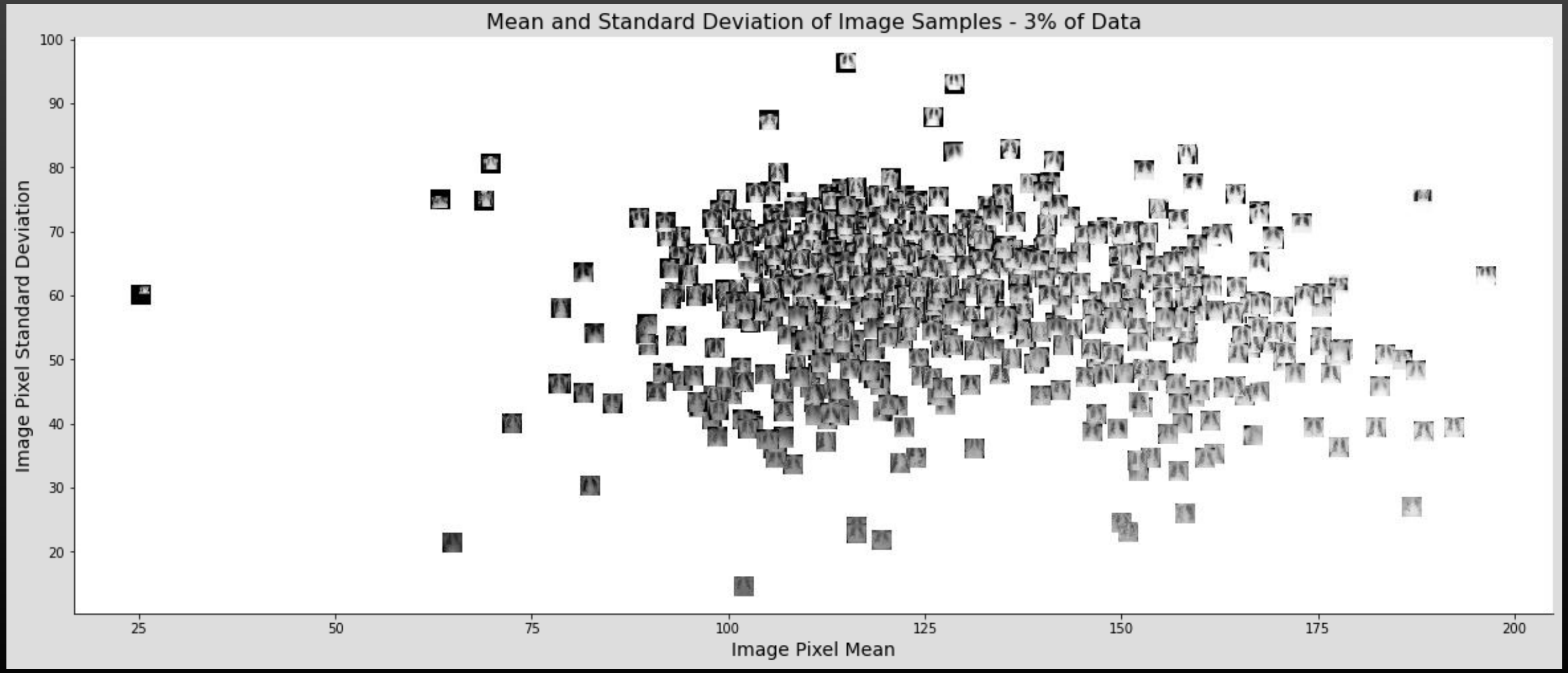
Objective

- Use machine learning to classify chest X-Rays into categories: Normal, Viral Pneumonia, Lung Opacity, COVID-19 with at least 85% accuracy.

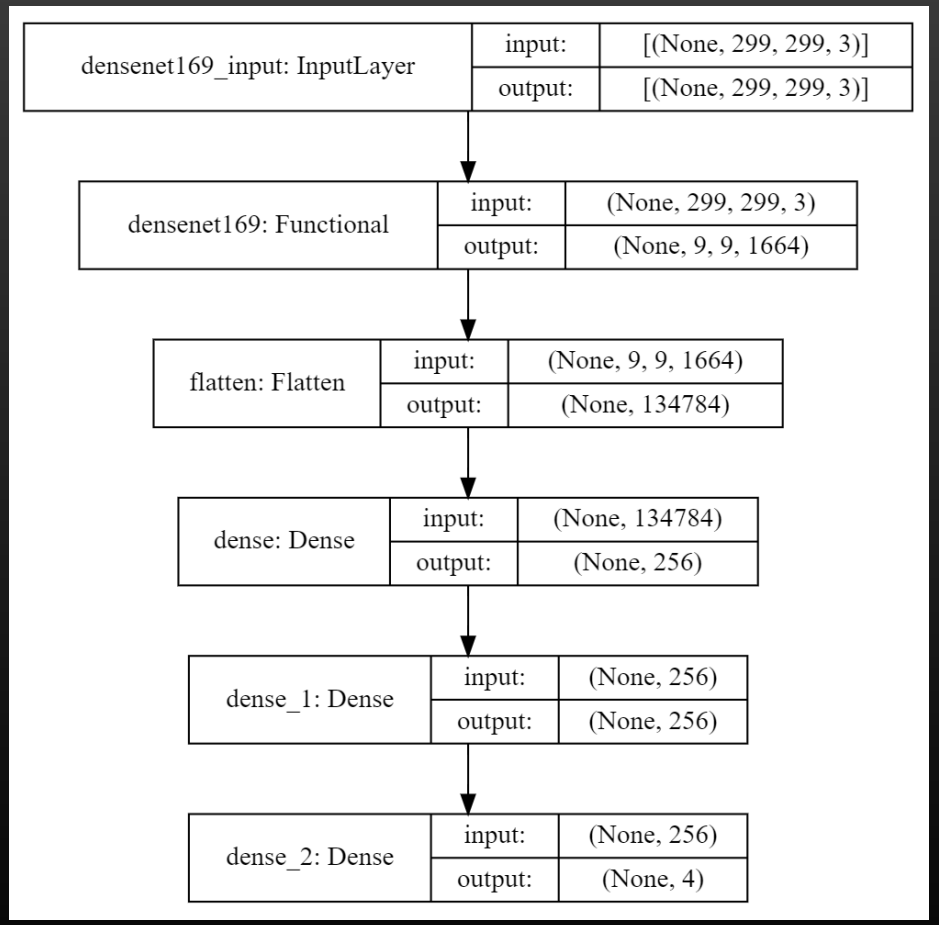
Stakeholders

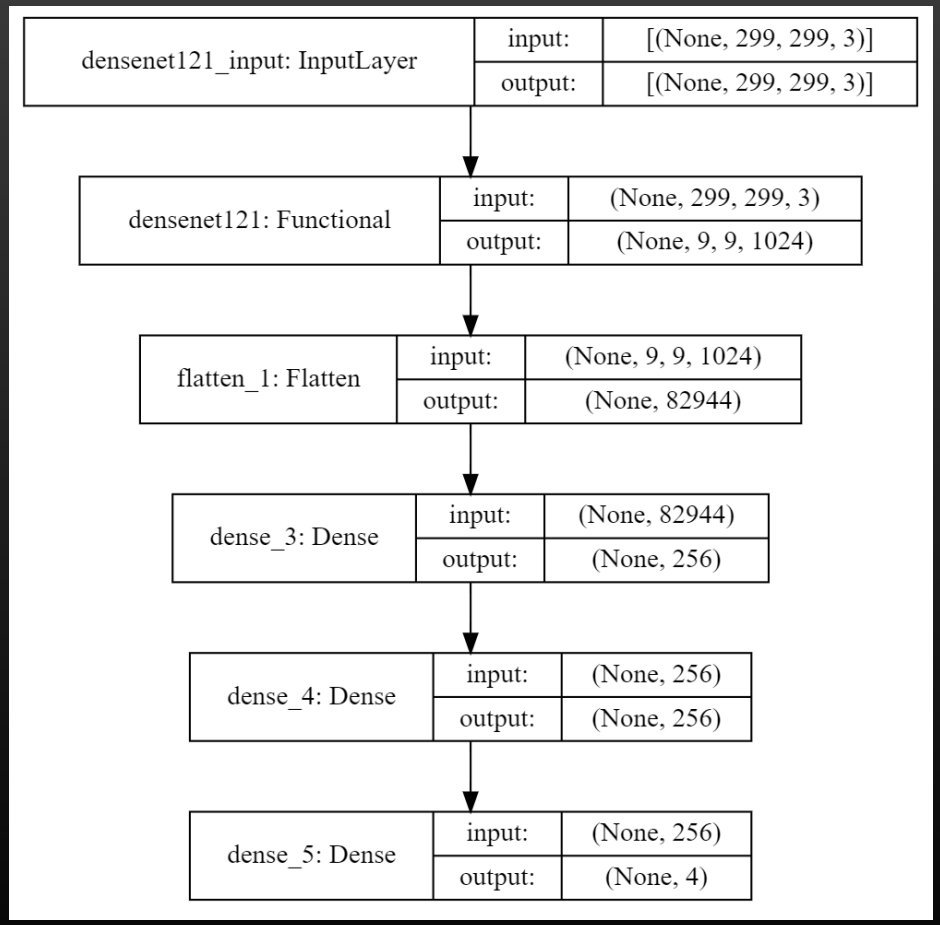
- Medical care teams worldwide

EDA

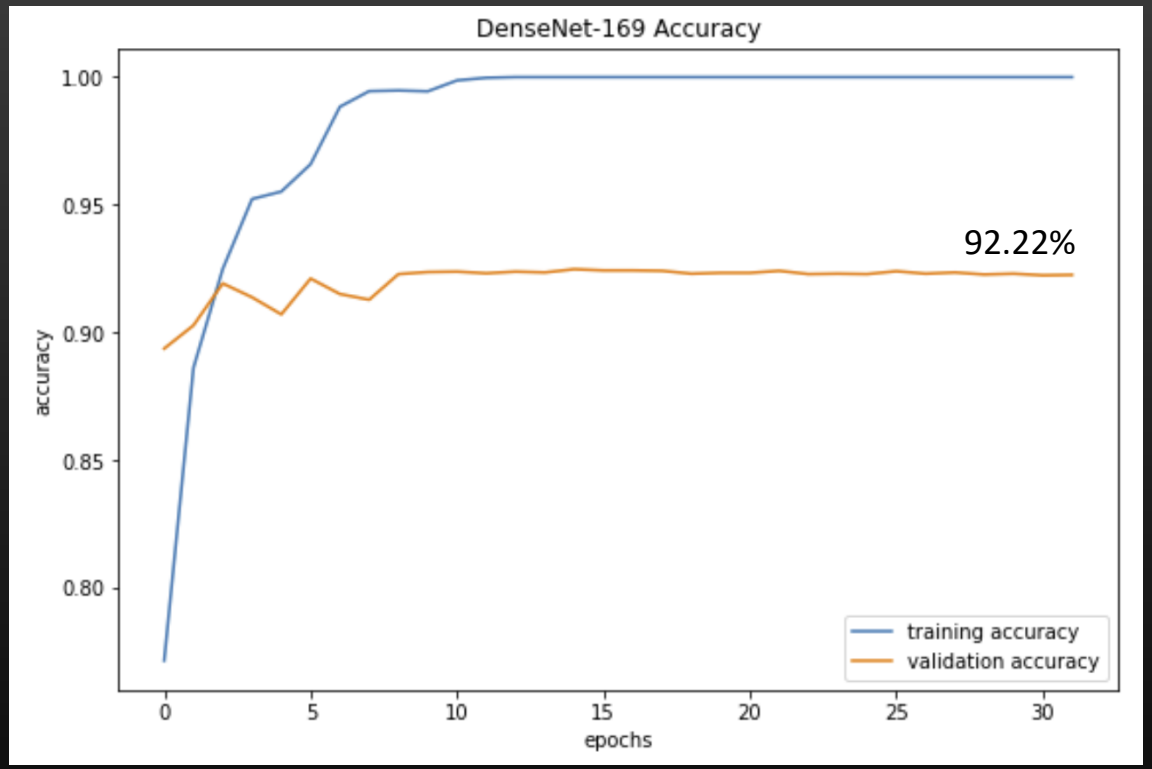

Mean and Standard Deviation of Image Samples - 3% of Data
Image Pixel Standard Deviation
Image Pixel Mean
100
90
80
70
60
50
40
30
20
25
50
75
100
125
150
175
200

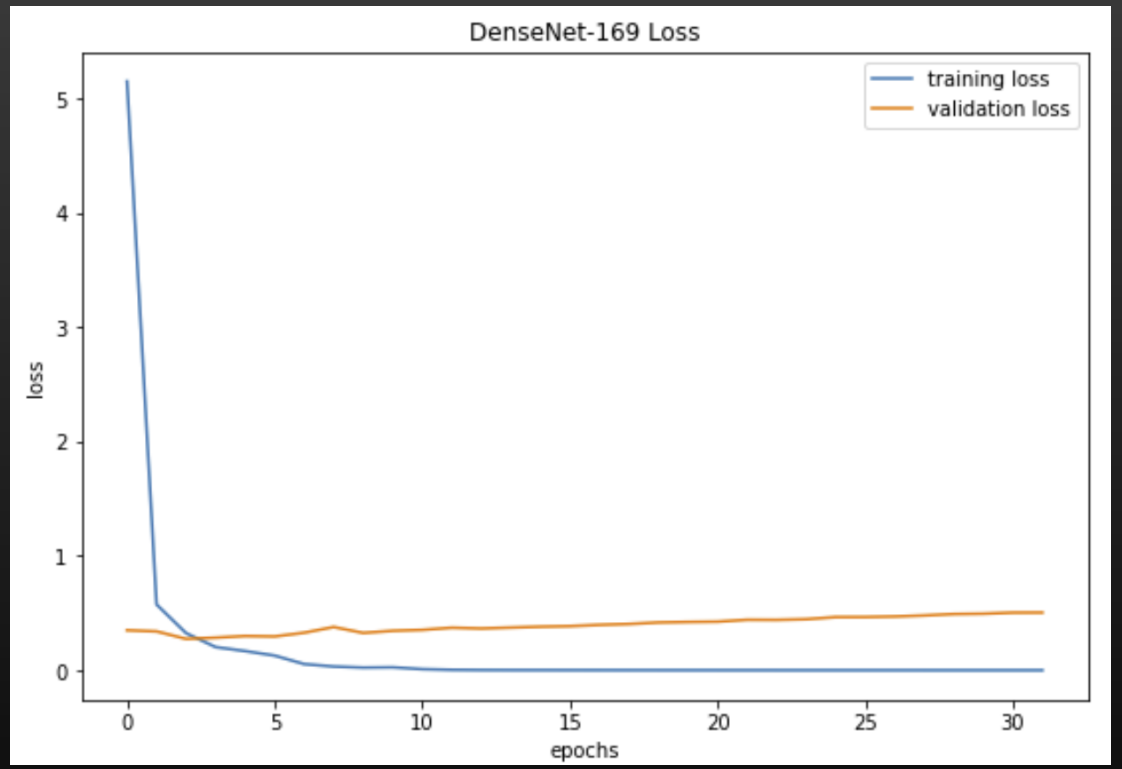
DenseNet-169 vs. DenseNet-121





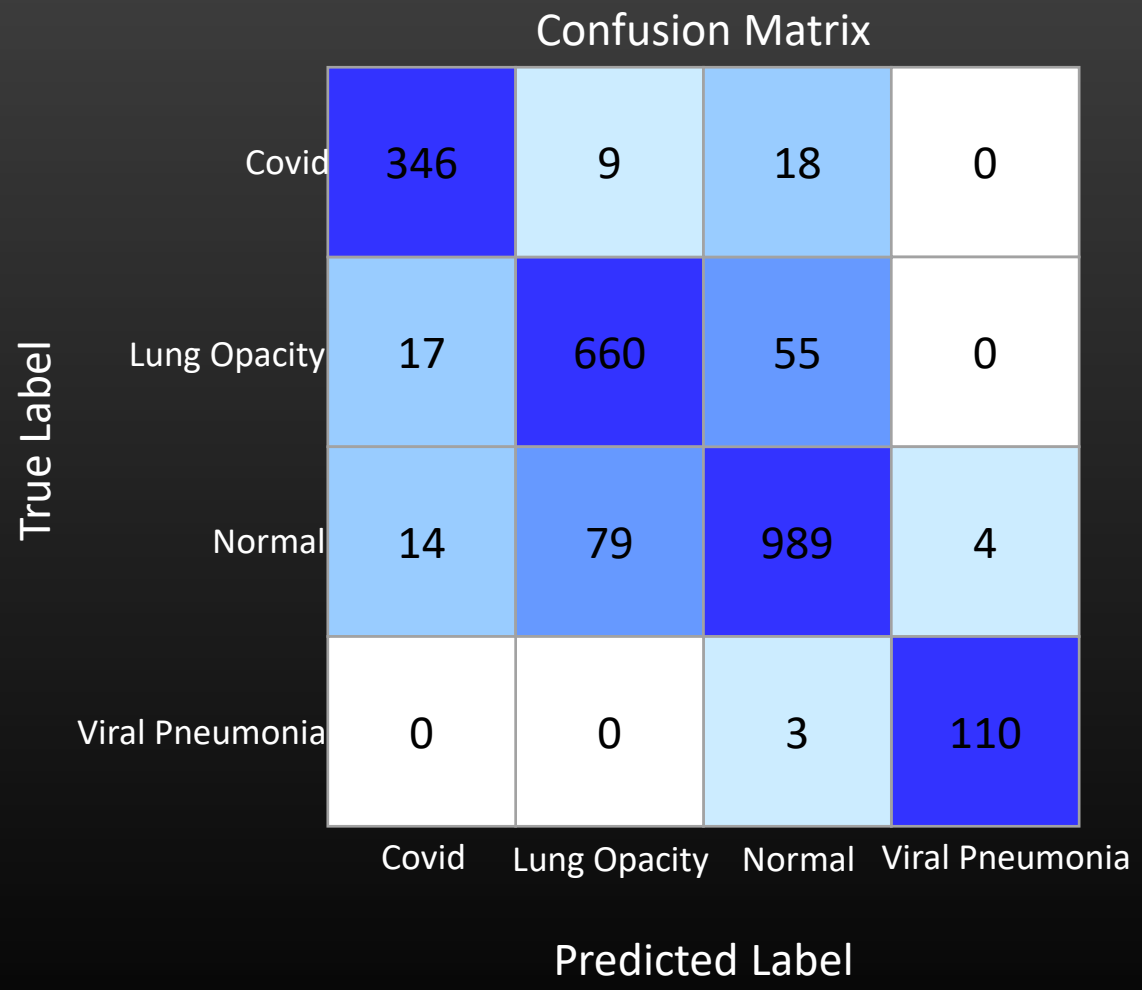
DenseNet-169 Performance





Summary and Conclusion

- The DenseNet-169 model performed well on the validation set at 92% Categorical Accuracy



Future Work

- Obtain more Covid samples to try to improve performance
- Try different models e.g., ResNet
- Model for classifying all medical imaging, such as:
  - X-rays
  - CT (computed tomography) scans
  - MRI (magnetic resonance imaging)
  - Ultrasounds
  - Positron-emission tomography (PET) scans

Sources

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-Rahman, T., Khandakar, A., Qiblawey, Y., Tahir, A., Kiranyaz, S., Kashem, S.B.A., Islam, M.T., Maadeed, S.A., Zughaier, S.M., Khan, M.S. and Chowdhury, M.E., 2020. Exploring the Effect of Image Enhancement Techniques on COVID-19 Detection using Chest X-ray Images. arXiv preprint arXiv:2012.02238.

**Data Sources:

[1]https://bimcv.cipf.es/bimcv-projects/bimcv-covid19/#1590858128006-9e640421-6711
[2]https://github.com/ml-workgroup/covid-19-image-repository/tree/master/png
[3]https://sirm.org/category/senza-categoria/covid-19/
[4]https://eurorad.org
[5]https://github.com/ieee8023/covid-chestxray-dataset
[6]https://figshare.com/articles/COVID-19_Chest_X-Ray_Image_Repository/12580328
[7]https://github.com/armiro/COVID-CXNet
[8]https://www.kaggle.com/c/rsna-pneumonia-detection-challenge/data
[9] https://www.kaggle.com/paultimothymooney/chest-xray-pneumonia